PRESTON Aviation SOLUTIONS®

A Boeing Company

TAAM

TIM 2005: Paul Kennedy

Agenda

1. Development Objectives
2. User Workflow
3. Model Extensions
4. Interoperability

Objectives

Three objectives to all TAAM development

1. **Keep refining the model**
   - Add further detail to the TAAM model to more precisely reflect ATC practice *(Keep stakeholders happy)*
2. **Improve User Workflow**
   - Ensure time spent developing projects is productive *(Allow more projects each year)*
3. **Support future concepts**
   - Increase the breadth of modelling possibilities *(Open up new modelling opportunities)*

User Workflow

User Workflow

TAAM customers vary in product familiarity and domain background.

Numerous changes to improve the user workflow over the last three years:

- Application
  additional reports created
  diagnostics extended to be more human readable
  removal of deprecated capabilities
  Report Automation
- Data converters
  support for additional projections in DXF
- Documentation
  rewrite of all user documents
- Training
  Syllabus rewritten, new content, one or two week courses

Model Extensions

Model extensions - TMA

Arrivals

- Vectoring areas on STARs
  User defined area used by TAAM to delay/expedite aircraft for arrival sequencing
- Arrival runway predictions
  Predict airport demand at time of landing to select better runway
- Sequencing points
  Extension to classic sequence at threshold. Aircraft can sequence at waypoints

Departures

- RNAV SIDs
  Define SIDs as a set of lat/long/alt/speed/turn-type points
- Dynamic runway/SID reallocation
  Rulebase controlled reallocation of runways or SIDs while aircraft taxi out

Model Extensions - Enroute

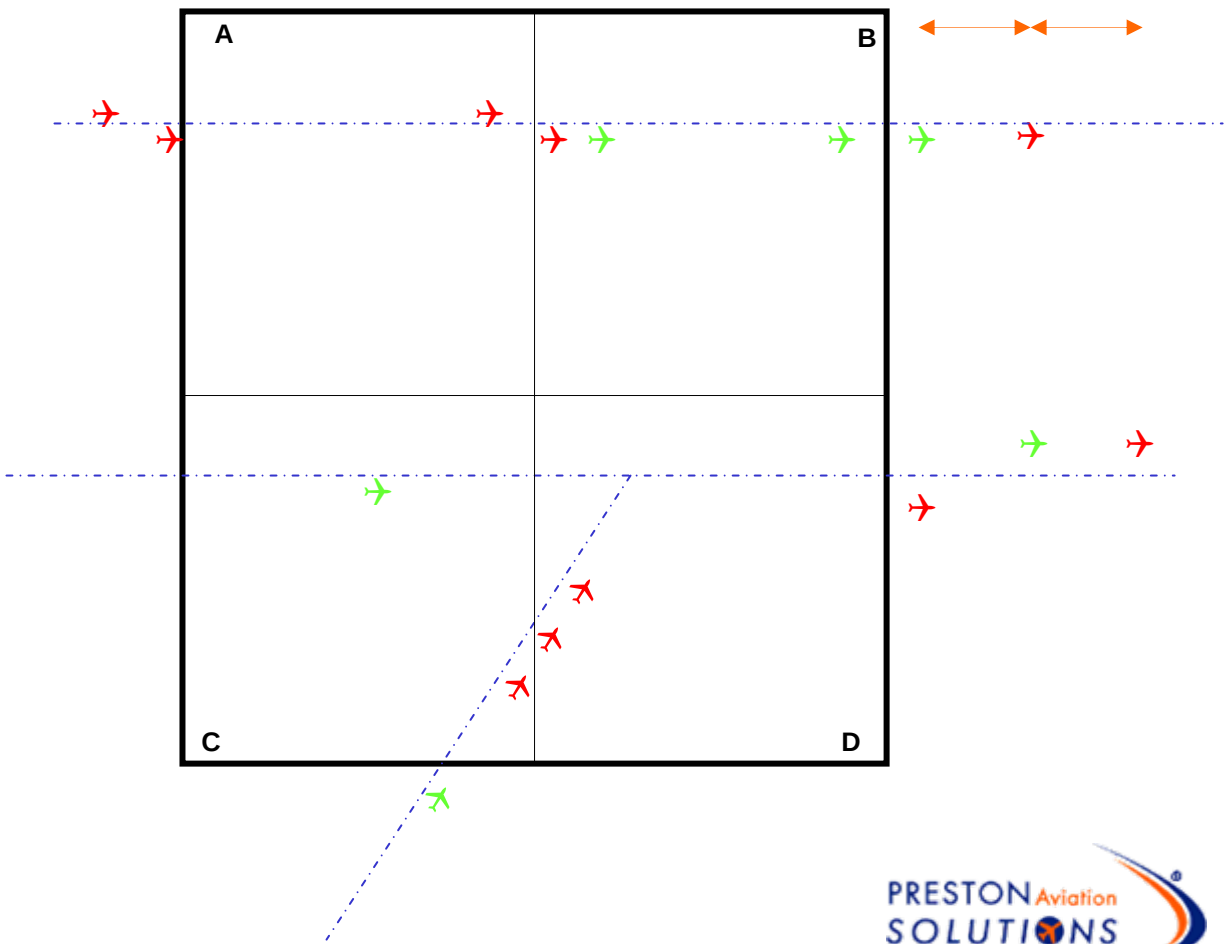
Three components in the Enroute ‘toolbox’

- Airspace rules (existing capability pre-2002)
  Rulebase can create new flightplan for aircraft
- Flow Management
  Meter flow of traffic through volume of airspace
- Dynamic Restrictions
  Part of airspace rules
  Dynamically assign speeds or altitudes for intervals or points

Model Extensions – Flow Management

Three steps to FM

1. Define volume
   tessellation of sectors (A,B,C & D)
2. Define flow
   sets of aircraft (all red)
3. Define Spacing
   Dynamic exit spacing (8nm for red)



TIM 2005

Future Concepts

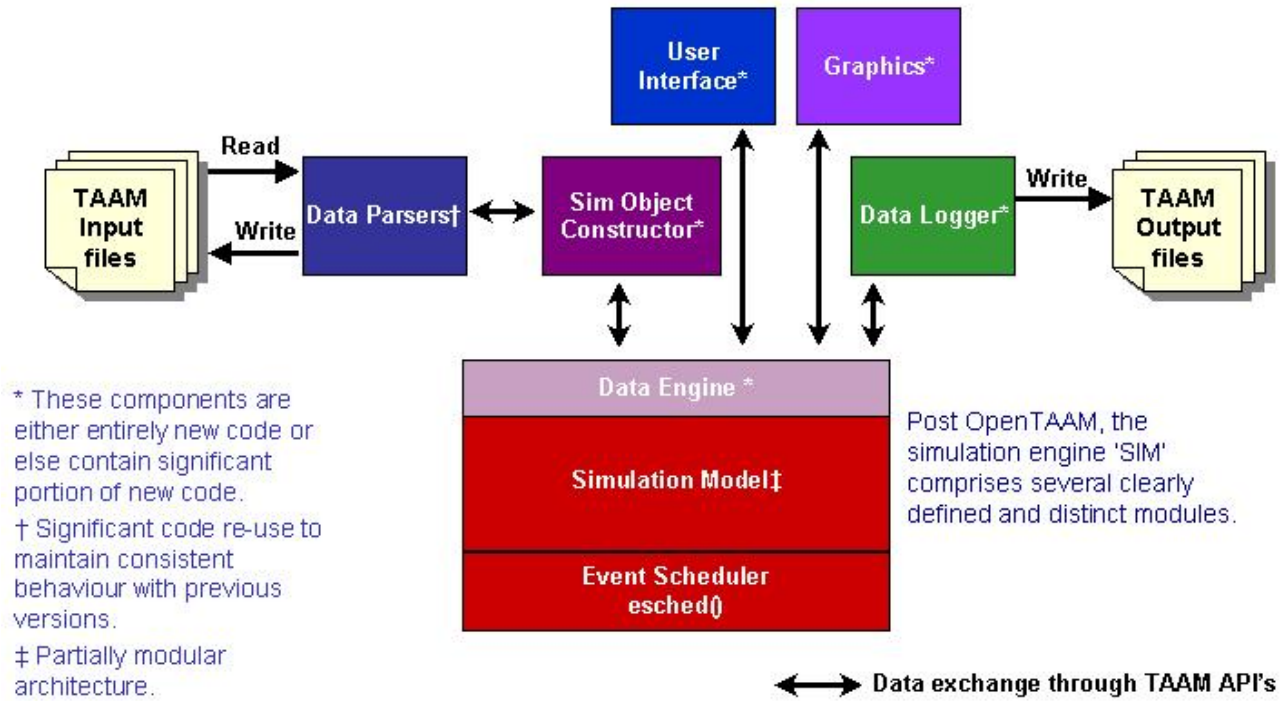
(through interoperability)

PRESTON Aviation SOLUTIONS

Model Re-architecture

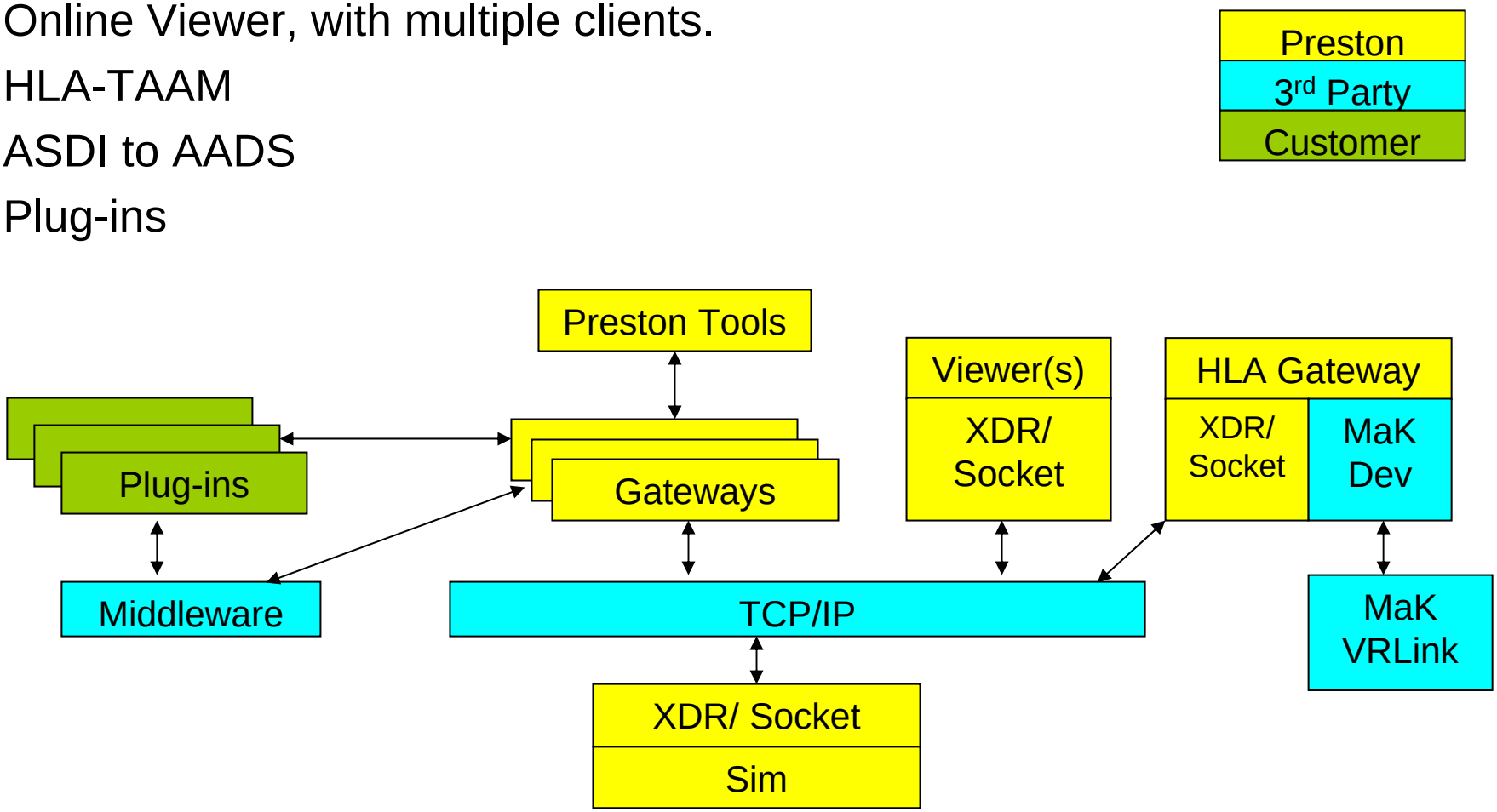
From 2001-2003 Preston re-architected TAAM

New architecture has enabled rapid development for interoperability



New Capabilities - External Clients

- Online Viewer, with multiple clients.
- HLA-TAAM
- ASDI to AADS
- Plug-ins



HLA

HLA-TAAM

- Customisation for Boeing Australia
- Implemented using MaK technologies
- RPR FOM
- Publish only

TAAM is used to generate background traffic for Boeing HIL simulators

Plug-in

Concept: delegate some decision making to an external application to either:

- Augment TAAM model with an expert system, or
- Use TAAM as a test bed for external application

Prototype developed 2004

Under evaluation in 2005

Prototype report

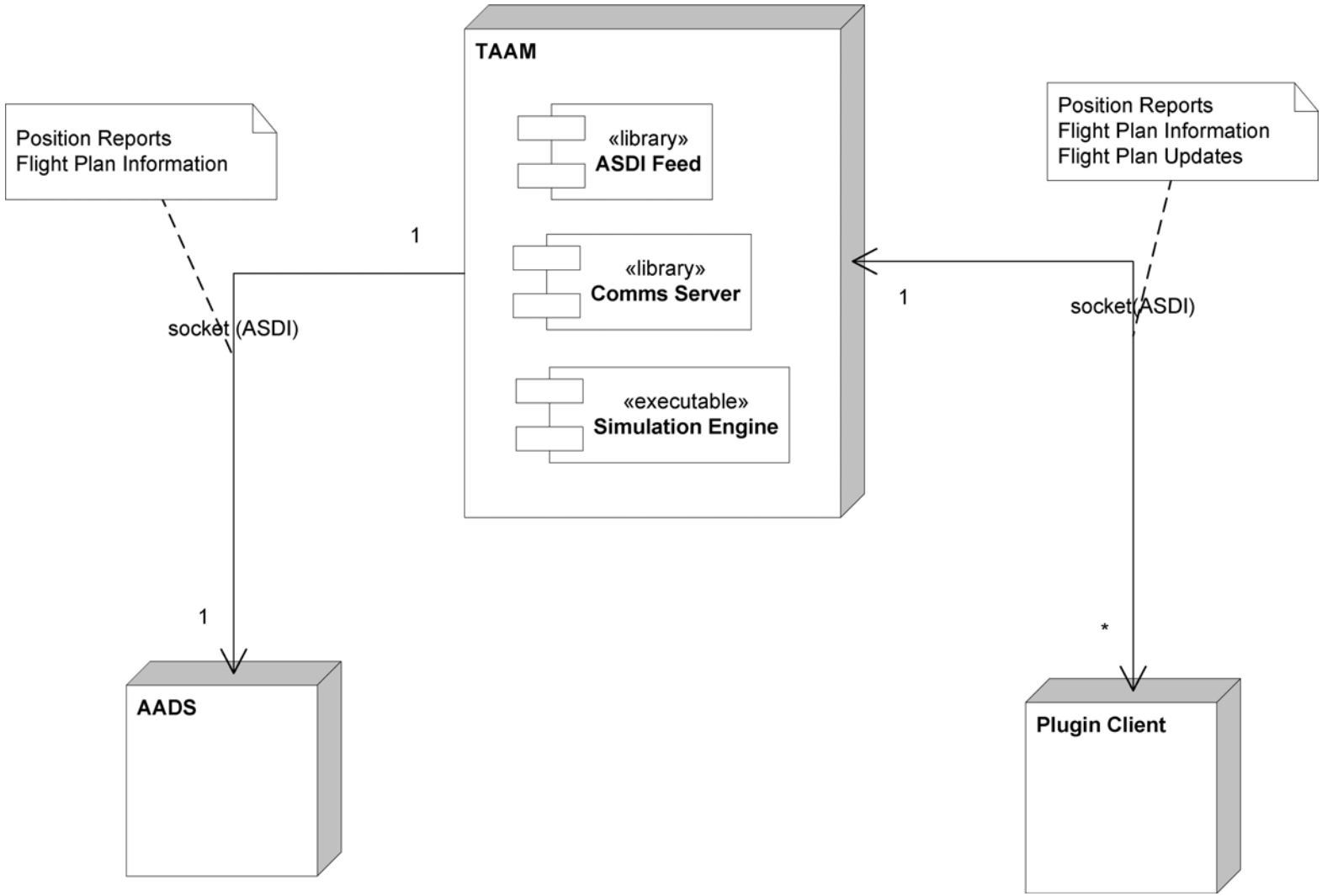
Conflict Resolution selected for prototype

- Easy to build a simple, yet illustrative, plug-in
- A number of real-world initiatives in same domain

Design decisions:

- Sockets used for communication
  Already used in Preston, high performance
- Client written in Java
  Fast development language, platform independent
- ASDI (Aircraft Situation Display for Industry) used for message format
  Parsing Code available in Preston (AADS) FZ, AF, AZ, DZ and TZ for initial flight plan, flight plan updates, flight arrival, departures and position events
- Aircraft behaviour controlled using a modified *fly_new_path*

Plug-in architecture



Implications and next steps

TAAM as Test bed

- Sequence order generator
  Test alternatives to FIFO algorithm
- Continuous Descent Approaches
  Test algorithms for generation and application of CDAs.
- Congestion Management – Re-routing
  Test congestion re-routing algorithms.
- Departure Priority generator
  Try alternatives to FIFO

Augment TAAM Model

- Gate Allocation
  TAAM interface with Preston's Gate allocation optimisation software
- Flight Start
  TAAM interface with Preston's Paxsim to incorporate passenger issues into model.
- Flight linking
  Use external application to optimise flight linking.

Airline Behaviour Model

Collaboration with Boeing Commercial 2005 - 2006

TAAM models aircraft behaviour.

Boeing models airline behaviour which result in specific actions for aircraft in TAAM

- Consequential delays
- Tail Routing
- Cancellations
- Tail-swaps
- Manage flight and scheduled maintenance activities

Helping our customers increase the efficiency, capacity and safety of the global aviation industry through the provision of integrated simulation, decision support and scheduling solutions

www.preston.net

Managing Tomorrow Today